Anesthesia and Early Onset Scoliosis Surgery: Minimizing Risk In Syndromic Patients?

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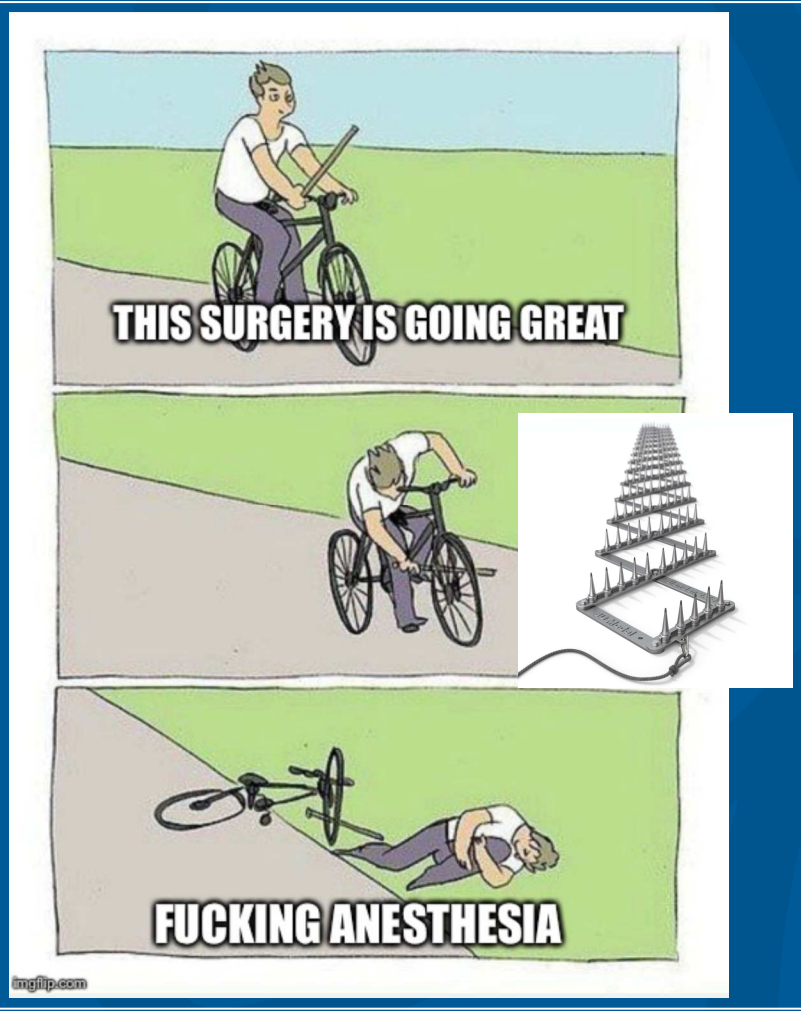
Disclosures

a. Grants/Research Support
b. Consultant
c. Stock/Shareholder
d. Speakers' Bureau
e. Editorial/Governing Board
f. Other Financial Support

Lydia E. Andras MD – Eli Lilly (c)



Syndromic Patients

Anesthetic Safety

- Serious adverse events 1.4 per 1000 anesthetics
  - Airway/Respiratory #1
  - Cardiac arrest #2
  - Medication error/equipment #3
- 30,000 pediatric anesthesia MRI sedations from Pediatric Sedation Research Consortium, zero deaths, 5.3% brief oxygen desaturation
- For syndromic EOS patients these numbers are likely higher: ASA 3 and 4, long surgery, hemodynamic shifts, multiple comorbidities

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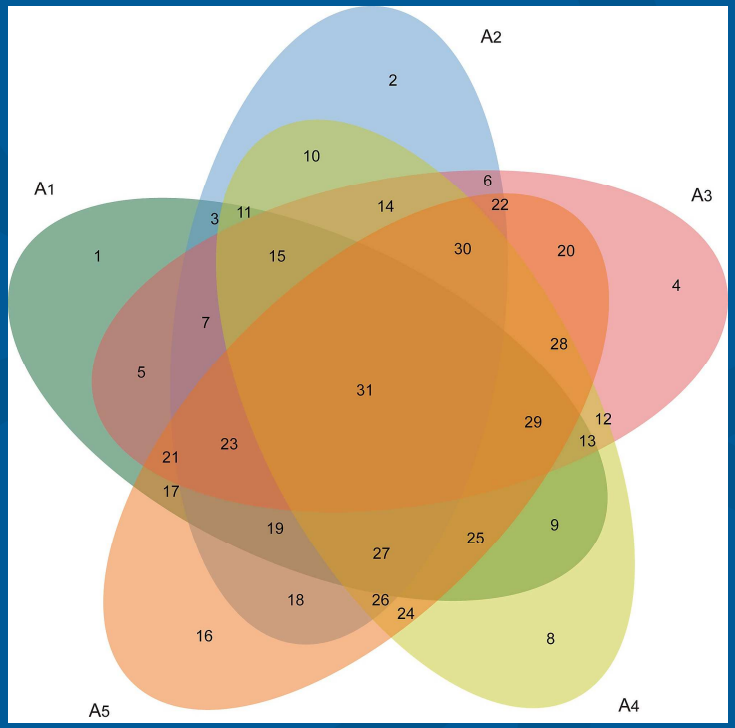
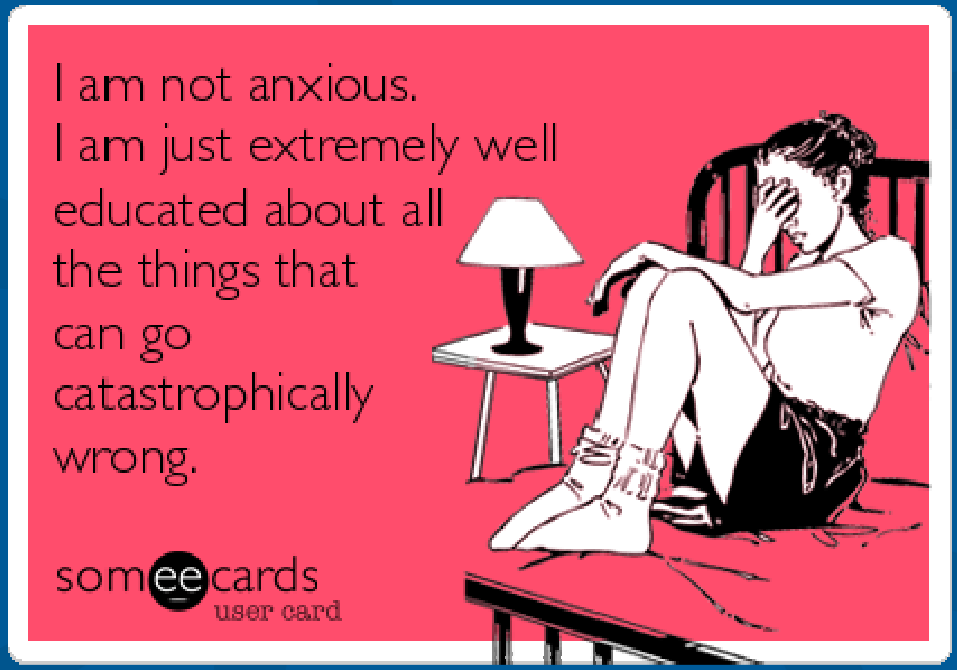


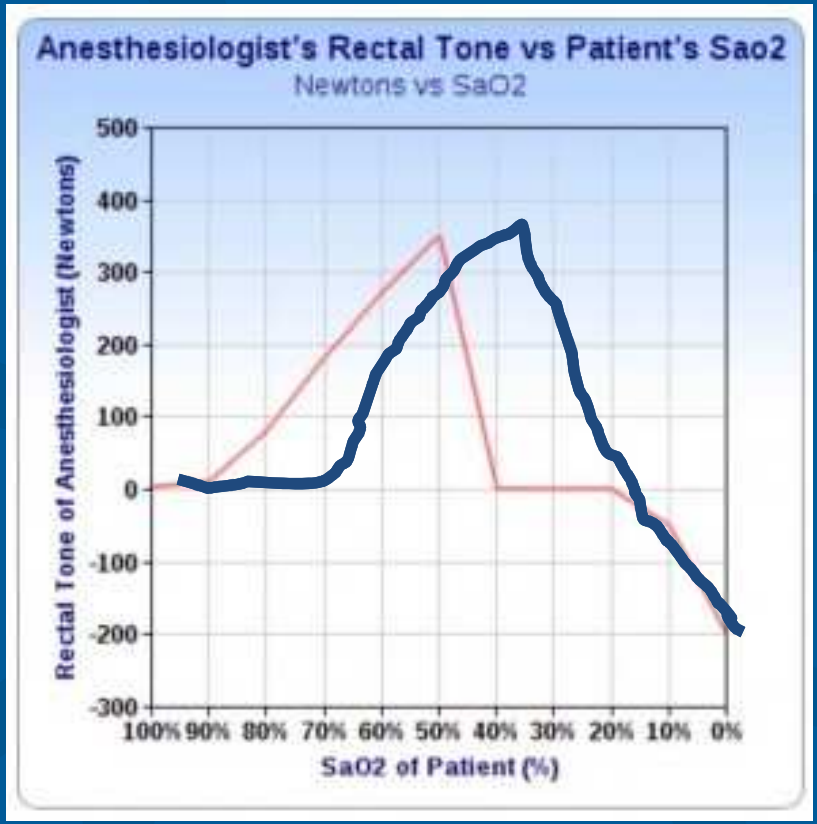
Anesthetic Safety in EOS Surgery for Syndromic Patients

- Airway
- Cardiac
- Respiratory
- Drug reaction
- Neurotoxicity
- Positioning



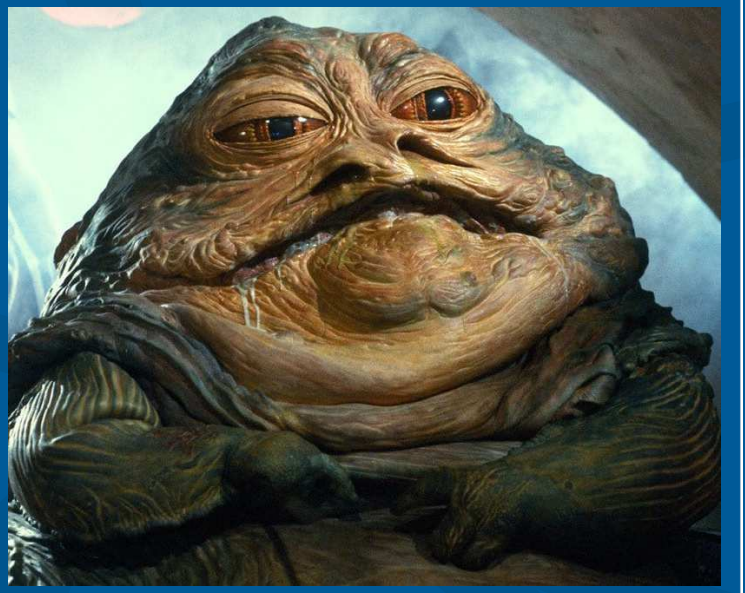
Airway

- Ventilating
- Intubating
- Avoiding Aspiration
- Extubating



Airway

- Screening Syndromic Patients' Airways
  - Limited neck mobility/Thick neck
  - Limited mouth opening or small mouth
  - Large tongue
  - Short chin
  - History of previous difficult intubation/ventilation
  - Mallampati vs COPUR (Chin, Opening, Previous difficult intubation/OSA, Uvula visualization, Range of opening)
  - Known Offenders: Mucopolysaccharidoses, Trisomy 21, Apert, Klippel-Feil, etc.



Airway

- Experienced providers
- Airway Adjuvants
  - Video laryngoscopy, Fiberoptic, Intubating LMAs
- ENT available
- Schedule Wisely
  - First case, weekday, extra time

Airway

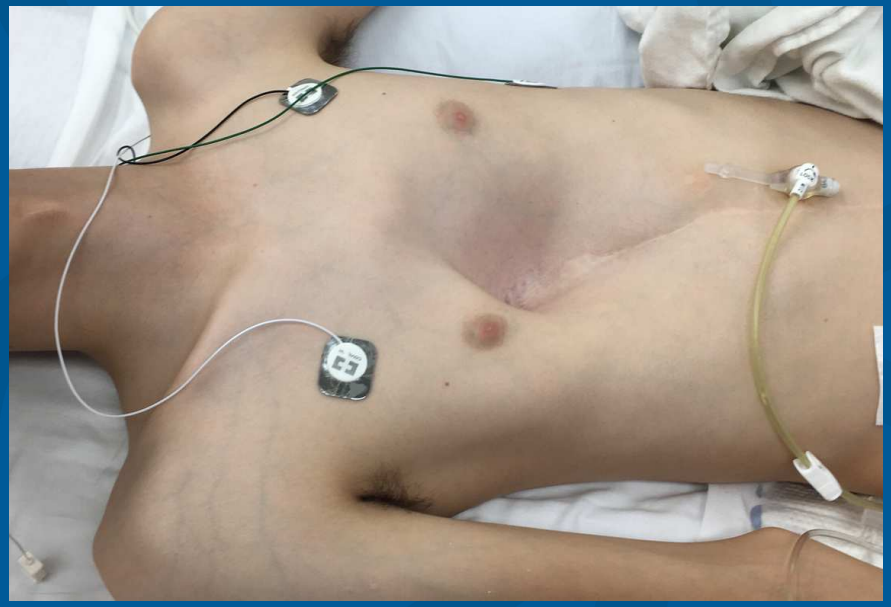
- Aspiration
  - Increased risk in patients with decreased esophageal tone, delayed gastric emptying
  - NPO violations- DELAY!
    - Clears-2 hours
    - Breast milk- 4 hours
    - Formula/light meal-6 hours
    - Full meal- 8 hours
  - Commonly seen with: Rett, Angelman, obesity (Prader Willi, Trisomy 21)

Airway

- Extubating
  - For: decreased risk of pulmonary infection, decreased likelihood of tracheal stenosis, sedation not required, don't HAVE to go to ICU
  - Against: Reintubation (harder), risk of acute respiratory events, not able to support ventilatory status in high risk time

Cardiac

- Patient's intrinsic risk-Are they optimized?
  - Congenital heart disease: VACTERL, Trisomy 21, Marfan, Noonan, Ehlers Danlos
  - Pectus: Marfan, Ehlers Danlos, Noonan, OI
  - Conduction abnormalities: Rett(QT), Angelman and Trisomy 21 (bradycardia)
  - Myopathy: Muscular dystrophies
  - Pulmonary Hypertension/Right heart failure: Depending on curve and comorbidities many!
  - Cardiovascular Disease: Prader Willi
  - SBE prophylaxis: Dependent on diagnosis but certain subgroups at increased risk



Pediatric Cardiology
October 2019, Volume 40, Issue 7, pp 1468–1475 | Cite as

Adverse Perioperative Events in Children with Complex Congenital Heart Disease Undergoing Operative Scoliosis Repair in the Contemporary Era

Authors Authors and affiliations

Robert Przybylski, Daniel J. Hedequist, Viviane G. Nasr, Mary Ellen McCann, Robert M. Brustowicz, John B. Emans, Audrey C. Marshall, David W. Brown

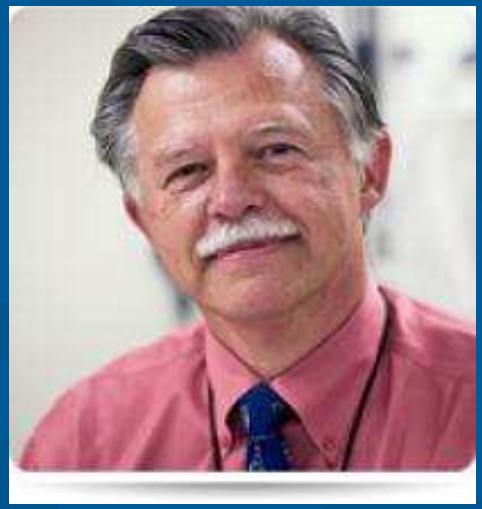
- Single Institution- 78 patients
- ~20 % complication rate
- No Deaths
- Large Cobb angle and cyanotic single ventricles highest risk

Cardiac

- Surgical Risk- minimize what you can:
  - Controlled Hypotension BUT not in cardiomyopathy, single ventricle, unstable patients
  - Antifibrinolytic (TXA)
  - Blood available (may take longer, may need more than you think you need)
  - Rapid Transfusion available
  - Staging

Respiratory

- Restrictive lung disease: Many!!
- Pneumothoraces: connective tissue disorders
- Recurrent Pulmonary Infections: Trisomy 21
- Obstructive Sleep Apnea: MANY! Trisomy 21, Prader-Willi (can be worsened with GH), Hunter/Hurler



Respiratory

Sleep Apnea:

Severity of OSA	Adult AHI	Pediatric AHI
None/normal	0-5	0
Mild OSA	5-20	1-5
Moderate OSA	20-40	5-10
Severe OSA	>40	>10

J Intensive Care Med. 2017 Mar;32(3):204-211. doi: 10.1177/0885066616661152. Epub 2016 Aug 20.

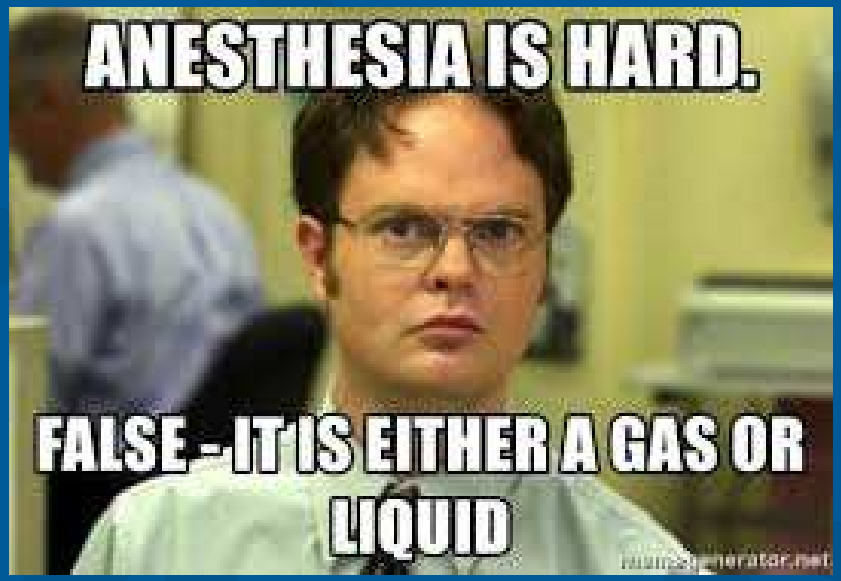
Analysis of Unplanned Intensive Care Unit Admissions in Postoperative Pediatric Patients.

Landry EK[1], Gabriel RA[2], Beutler S[1], Dutton RP[3], Urman RD[1].

- 324,818 cases analyzed, 211 unplanned ICU admissions
- Risk Factors: age less than 1 year, ASA 3 or 4, longer surgery, surgery with general anesthesia

Drug Reactions

- Anesthetic Gasses/Succinylcholine
  - Malignant hyperthermia
    - King Denborough, Multiminicore, Central core, Nemaline Rod myopathy (certain variants), RYR1
  - Rhabdomyolysis/hyperkalemia
    - Muscular dystrophies



Drug Reactions

- www.mhaus.org
- First Cases (or be prepared for delay)
- Delayed emergence

Drug Reactions

- Anaphylaxis
  - 1:10,000…likely more
  - Antibiotics, Neuromuscular Blockers, Chlorhexidine, Latex
  - Hypotension, Bronchospasm, Urticaria, Angioedema
  - Secure airway…if not already intubated can make a tough job tougher

BJA

British Journal of Anaesthesia, 121 (1): 159–171 (2018)

doi: 10.1016/j.bja.2018.04.014
Advance Access Publication Date: 21 May 2018
Special Article

Anaesthesia, su
reactions: epide
perioperative a
Project (NAP6)

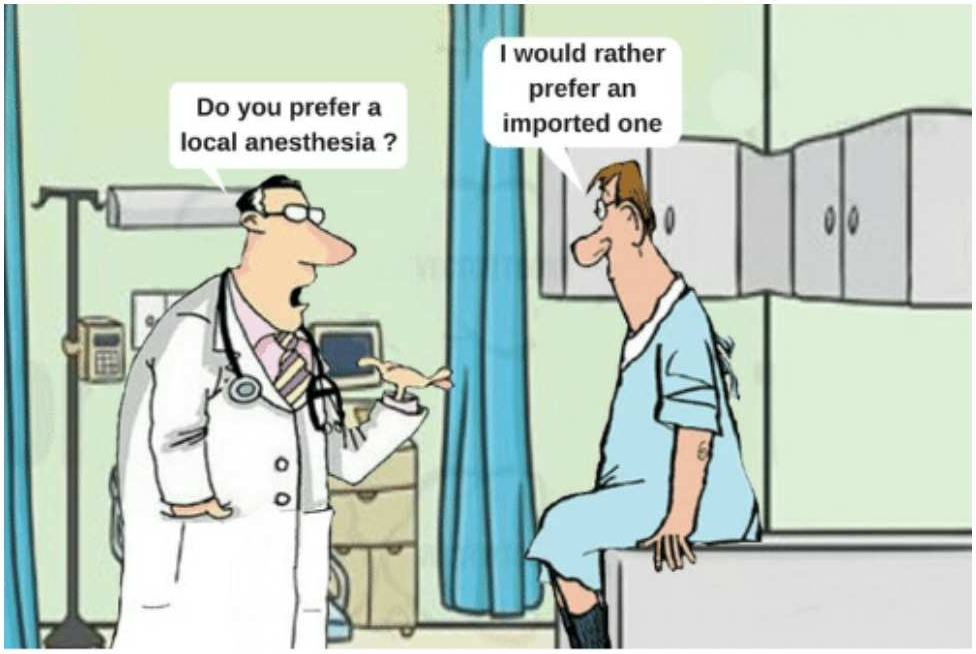
N. J. N. Harper[1,2,3], T.
S. Marinho[9], H. Torev
W. Egner[12,13], H. Kem
S. Karanam[18], K.-L. Ko

Source: Goldsmith LA, Katz SI, Gilchrest BA, Paller AS, Leffell DJ, Wolff K: *Fitzpatrick's Dermatology*

Allergies: amoxicillin->throat swelling, gold->skin turns green

Neurotoxicity

Neurodevelopmental outcome at 5 years of age after general anaesthesia or awake-regional anaesthesia in infancy (GAS):



by neuronal association s are prone esia in early

Age

MPH, ays, MD, oun,

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ELSEVIER

Spine Deformity

Volume 6, Issue 6, November–December 2018, Pages 781-786

Case Series

Cumulative Anesthesia Exposure in Patients Treated for Early-Onset Scoliosis

Fady J. Baky BS [a], Todd A. Milbrandt MD, MS [a], Randall Flick MD, MPH [b], A. Noelle Larson MD [a]

- Early presentation and treatment with casting more likely to have over 3 hours before 3 years of age

SPINE. 44(12):866–871, JUNE 15, 2019
DOI: 10.1097/BRS.0000000000002966, PMID: 30540716
Issn Print: 0362-2436
Publication Date: June 15, 2019

Print

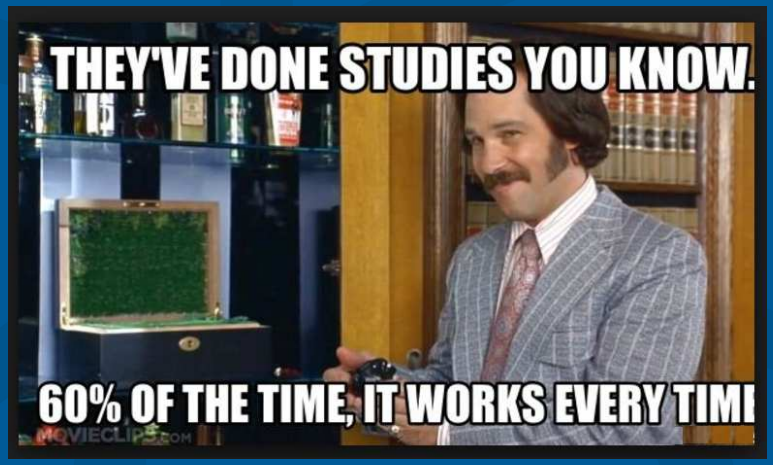
Limited Sequence MRIs for Early Onset Scoliosis Patients Detected 100% of Neural Axis Abnormalities While Reducing MRI Time by 68%

Rajan Murgai;Benita Tamrazi;Kenneth Illingworth;David Skaggs;Lindsay Andras;

- Less Anesthesia Time=Less Risk

Positioning

- Much be extra cautious:
  - Fractures- OI (BP cuff, wake up, bed rails)
  - Injuries due to hypermobility: Ehlers Danlos, Marfan
  - Pectus- chest rolls
  - Injuries due to instability: more to come in the next talk ☺



No pressure on the central portion of the chest

Consider intraoperative TEE

Positioning

- Communicate with the team

- Fix what you can, optimize what you can, and be prepared for what you can’t

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